# Utah Governor's Energy Development Summit

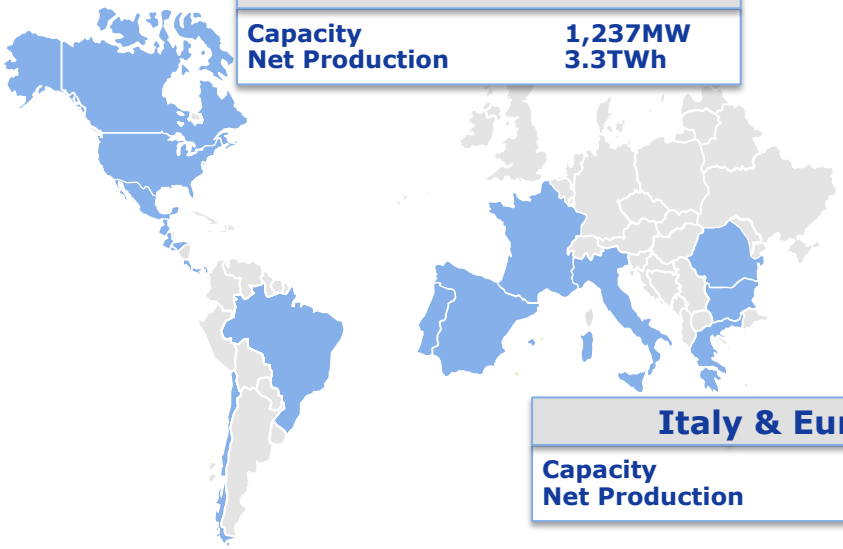
## *"Reducing the Risk & Cost of Geothermal Exploration in Utah"*

Robert Manasse
SVP Regulatory Affairs and Innovation, Enel Green Power North America
January 11, 2013 – Salt Lake City (Utah)





# Enel Green Power
## A global leader in renewables



**North America**

| | |
|---|---|
| Capacity | 1,237MW |
| Net Production | 3.3TWh |

**Italy & Europe**

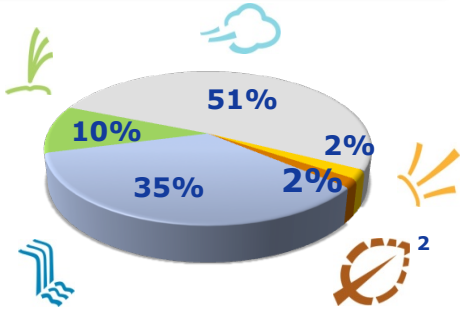
| | |
|---|---|
| Capacity | 3,660MW |
| Net Production | 12.5TWh |

**Iberia & Latin America**

| | |
|---|---|
| Capacity | 2,657MW |
| Net Production | 7.5TWh |

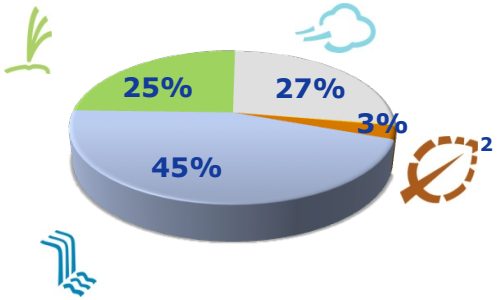
Countries where EGP operates

**Capacity by technology[1]**




**Total = 7.6GW**

**Production by technology[1]**




**Total = 23.3TWh**

**Operating in 16 countries, in all major technologies**

1. Reported capacity for EGP Group as of June 30, 2012 (North America closed 2012 with 1,672 MW). Reported production LTM
2. Including co-generation

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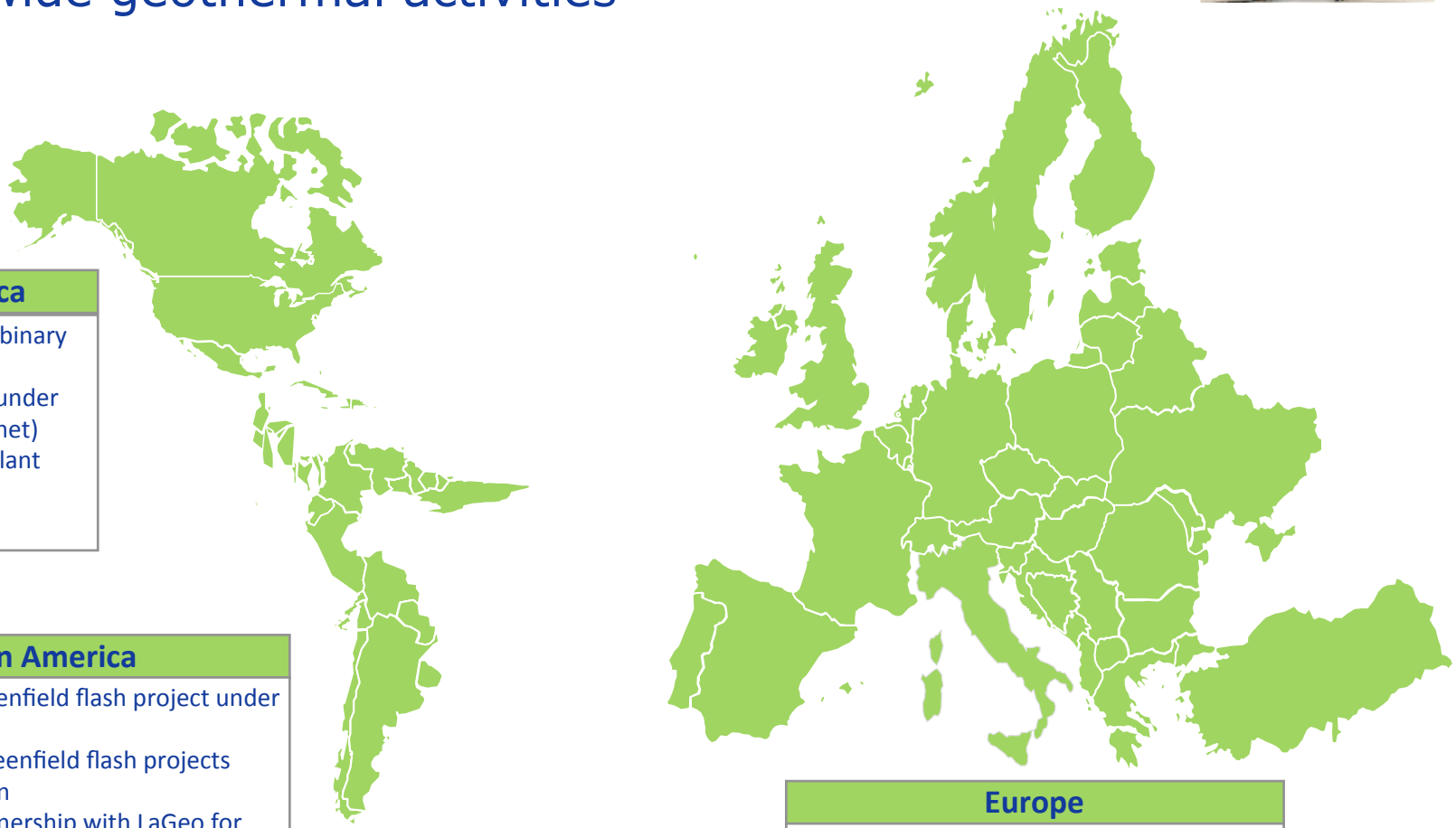
# Enel Green Power
## Diversified portfolio across North America

- Presence in 21 U.S. States and 3 Canadian Provinces
- More than 90 plants in operation with a total installed capacity approaching 1.7 GW
- Offices in Andover, Massachusetts (Headquarters); Washington, D.C.; San Diego, California; Reno, Nevada; and Montreal, Canada.
- More than 350 people employed in North America

| Technology | Capacity* |
|---|---|
| Hydro | 313 MW |
| Wind | 1,265 MW |
| Geothermal | 47 MW |
| Biomass | 21 MW |
| Solar | 26 MW |
| **Total** | **1,672 MW** |

* Installed capacity as of December 31. 2012

# Enel Green Power
## Worldwide geothermal activities



### North America
- **Nevada**: 2 operating binary plants (47 MWnet)
- **Utah**: 1 binary plant under construction (17MWnet)
- **California**: 1 binary plant under development (17MWnet)

### Latin America
- **Nicaragua**: 1 greenfield flash project under exploration
- **Guatemala**: 2 greenfield flash projects under exploration
- **El Salvador**: partnership with LaGeo for project in operations (200 MW flash)
- **Chile**: JV with ENAP for 2 exploration and additional permits (flash), more than 100 MW (drilling on going )

### Europe
- **Italy**: 35 steam and flash plants in operation (728 Mwnet) and additional 60 MW net under development
- **Turkey**: JV agreement for preliminary explorations

**Almost a century of experience in the geothermal business**

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# Enel Green Power North America

## Nevada: 2 operating plants

Name: **Stillwater**

Location: Fallon, Nevada

Capacity: 33.1 MW

COD: 2009

Technology: Binary Cycle with Rankine Cycle Configuration

Off-taker: NV Energy

Name: **Salt Wells**

Location: Fallon, Nevada

Capacity: 13.4 MW

COD: 2009

Technology: Binary Cycle with Rankine Cycle regenerative configuration

Off-taker: NV Energy

# Enel Green Power North America
## Utah: plant under construction

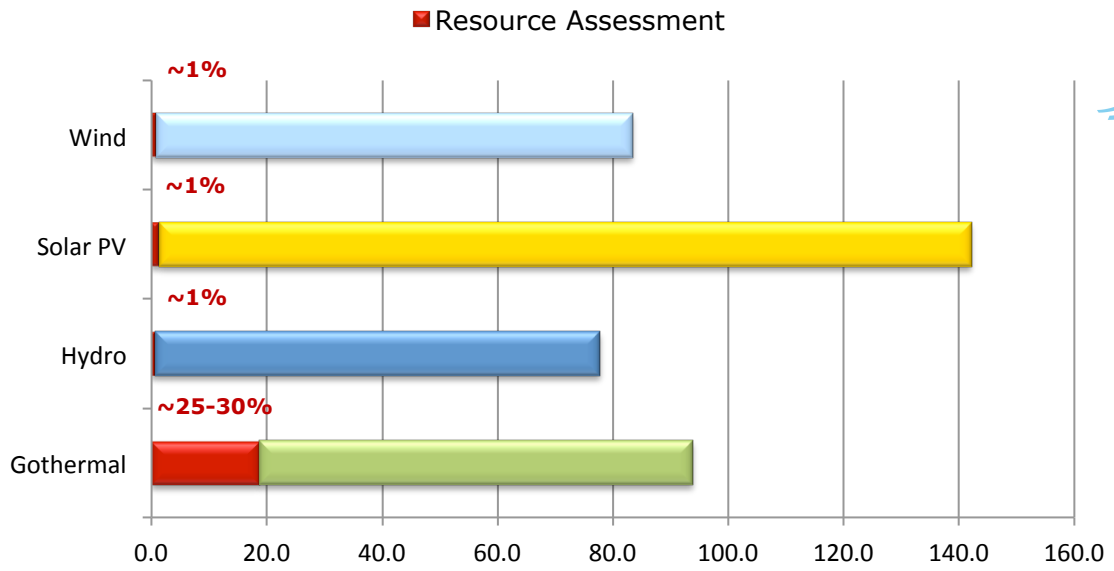
**Cove Fort Geothermal Project (Utah)**

- 25 MW geothermal project in Beaver County (Utah)
- Technology:
  - Air-cooled binary cycle (no use of natural water)
  - Ormat turbines
- Expected COD: December 2013
- Resource: fully drilled and tested well field
- Technology: air-cooled binary cycle (Ormat turbines)
- Estimated CAPEX: $120m
- PPA: signed and executed
- Interconnection agreement: signed and executed
- Transmission agreements: signed and executed

# Reducing Risk and Cost of exploration

## Levelized cost per technology

**Estimated Levelized Cost of New Generation Resources, 2017 (2010 $/MWh)**



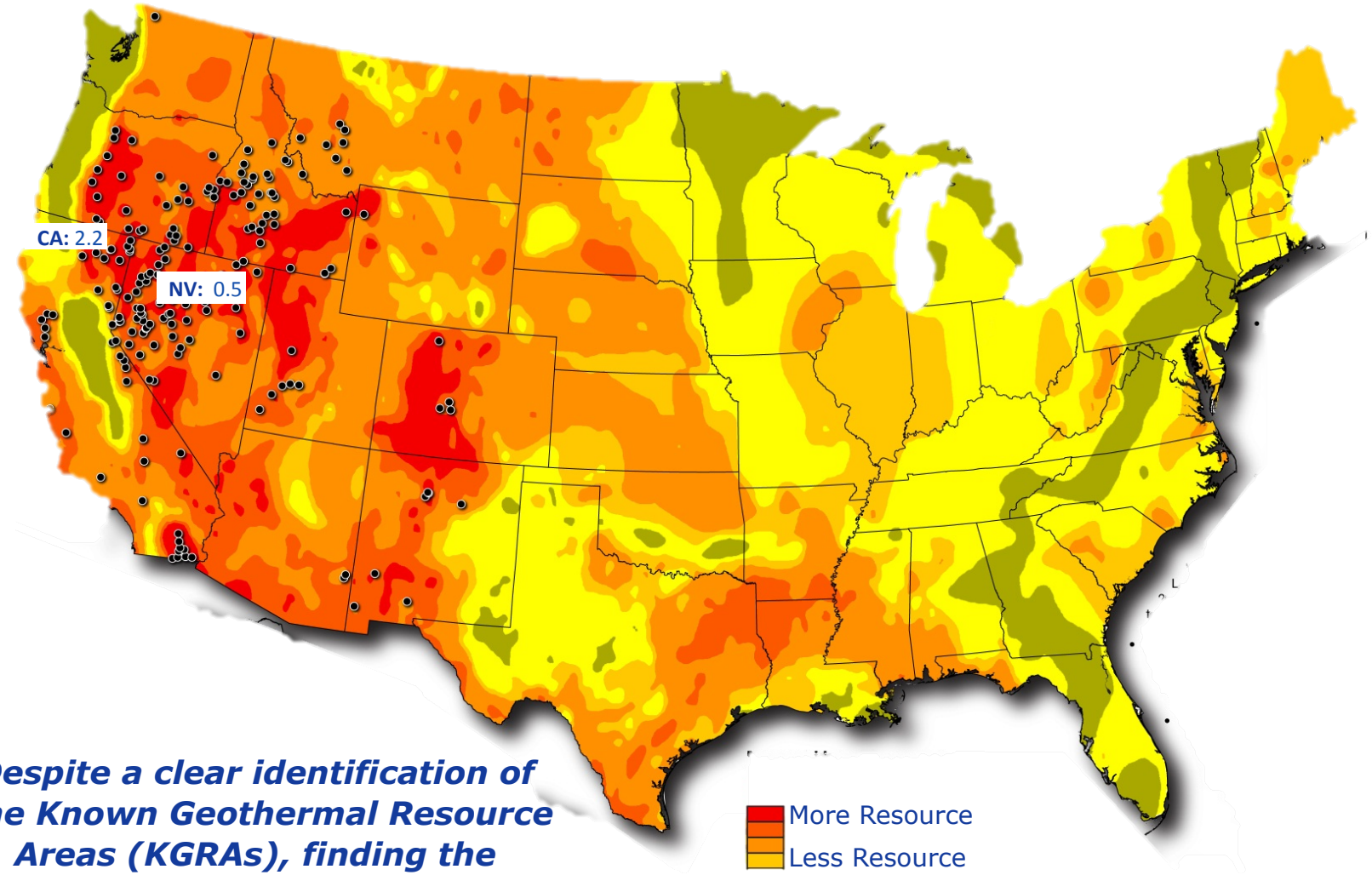

- Intermittent load, no depletion
- Intermittent load, no depletion
- Intermittent load, no depletion
- Base-load, depletion

Source: U.S. Energy Information Administration, *Annual Energy Outlook 2012*, June 2012

***Geothermal development has significantly different costs compared to the other technologies***

# Reducing Risk and Cost of exploration

## Identification of geothermal resource




***Despite a clear identification of the Known Geothermal Resource Areas (KGRAs), finding the "right" spot is still a challenge***

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# Reducing Risk and Cost of exploration

## Possible ways to reduce risks and costs of exploration

***"Every well field is unique"***

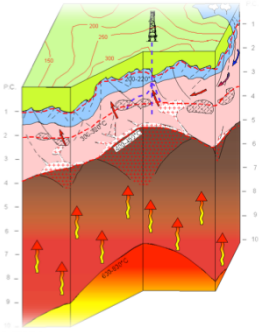
**Possible ways to reduce risk and costs of exploration**

- Management of the value chain: since almost 100 years, Enel has been involved in the development of geothermal projects covering all the activities of the value chain.
- In depth assessment of project viability before any drilling activity: clear understanding of the basic project fundamentals (resource, commercial viability, interconnection, transmission, permitting, …) before any money is spent on drilling. Enel Center of Excellence has an ample experience in conducting preliminary resource evaluations of sites in KGRAs worldwide.
- Stepwise resource assessment:
  - Confirm the resource in a stepwise approach from a desktop analysis, geological survey, exploratory drilling to drilling of full well field
  - Define a strategy for a well field using for example an option theory model
- "Flexible" PPA commitments:
  - Try to negotiate a broad min/max delivery requirements
  - Recovery of LOC if resource is insufficient
- Development of sites with resource potential for several projects, which allows for drilling of make-up wells to address depletion
- Partnership in early development stage: early stage equity commitments with financial and/or strategic partners

# Reducing Risk and Cost of exploration

## Management of the value chain

Drilling



Reservoir Engineering

Construction

**All these activities within the same group**

Operation & Maintenance

Workshop

Laboratory

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# Enel Green Power North America
Profile

## Robert Manasse
### *SVP of Regulatory Affairs and Innovation*

Robert Manasse joined Enel Green Power North America, Inc. (EGP-NA) in April 2009 as Vice President of Business Development with a specific focus on growing the geothermal business development pipeline from an operative base in Reno, Nevada.
On May 1, 2011 he was appointed to head the Company's Business Development efforts and since August 2012 he is Head of Regulatory Affairs and Innovation.
Following university graduation in the United States, Mr. Manasse taught for a number of years prior to leaving education to pursue a career in financial services. He directed the trade and investment efforts for the State of Kentucky International Economic Development Office, while based in Brussels, Belgium and New York.
The next phase of his career brought him to the field of energy development, energy procurement and logistics with the Coeclerici Group based in Washington, D.C., Milan, Moscow and Monaco. From 1998 to 2001, Mr. Manasse was responsible for building the European water, waste water and energy services business for Azurix Ltd and Enron Energy Services based in London before moving on to head the Commercial Finance operations in Milan, Italy for Maple Bank GmbH.
Fluently tri-lingual, Mr. Manasse was educated in Italian, international and American Schools in Europe. He completed his graduate and postgraduate degrees in the United States.

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